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Effect of Winter Distillers Grains Supplementation Level on Spayed Heifer Performance

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Summary

The effects of winter level of supplementation were evaluated using spayed heifers grazing winter corn residue followed by brome grass and native range grazing periods and finished on a common diet. Distillers grains were supplemented during winter corn residue grazing at 3, 5, and 7 lb per heifer daily. Gain during the winter phase increased while summer phase decreased with increasing level of winter supplementation. There were no differences in feedlot performance for either year across treatments. In year 2, HCW increased from 820 to 848 and 855 lb as heifers were supplemented 3, 5, or 7 lb distillers grains.

Introduction

In previous years grain prices have increased substantially. Thus, the cost to finish beef cattle has increased as well. One way to decrease the cost of finishing is use of a long yearling system to add weight prior to feedlot entry. Previous research (*2014 Nebraska Beef Cattle Report*, pp. 39–45) has shown that spayed heifers which are supplemented only during the winter period, have similar live performance in the feedlot and have increased profit compared to those supplemented in both the winter and summer periods. The increase in profit is the result of an increase in HCW sold when heifers were fed a greater level of supplement during the winter grazing period. However, the optimal amount of winter supplementation has not been defined.

The objective of this experiment was to determine the optimal level of distillers grains supplementation during the winter grazing period by evaluating heifer performance in the winter, summer, and finishing phases in a complete long yearling system. Carcass characteristics were also evaluated to determine if level of winter supplementation had an effect specifically on HCW and thus, the potential for increased profit.

Procedure

A study was conducted over 2 consecutive years utilizing 220 crossbred spayed heifers per year. Treatments included the supplementation of modified distillers grains plus solubles (MDGS) at 3, 5, and 7 lb per heifer per day during the winter corn residue grazing phase.

Winter Phase

Heifers were purchased, received for approximately 30 d then limit fed for 5 consecutive days prior to a 2 day weight collection, with the average as initial BW. Heifers were implanted with Ralgro and backgrounded on corn residue for approximately 150 days and supplemented with 3, 5, or 7 lb of MDGS (DM basis). Heifers were surgically spayed approximately half way through the winter phase.

Summer Phase

Heifers were removed from corn residue, placed in pens and limit fed for 5 consecutive days with a 2 day weight collected to serve as the initial summer BW. Ending BW for the winter phase was calculated as the average of the 2 day weight minus 1 pound for each day heifers were fed the limit diet to correct for weight gain during those 6 days. Heifers were implanted with Revalor-G and then grazed smooth brome grass for approximately 30 days. After grazing smooth brome grass, heifers were transported to UNL Barta Brothers Ranch near Ainsworth, Neb. to graze native Sandhills range for approximately 120 days.

Finishing Phase

Upon completion of summer grazing, heifers were transported to Northeast Research and Extension Center near Concord, Neb. At the facility, heifers were limit fed for 5 consecutive days with a 2 day weight collected. The average of the 2 day weight, corrected for limit fed weight gain, served as the ending BW for the summer phase, and the initial BW for the finishing phase. Heifers were assigned randomly to pen within winter treatment, implanted with Revalor-200® on day 1, and adapted to a common finishing ration containing 23.5% dry-rolled corn, 23.5% high moisture corn, 40% Sweet Bran®, 9% hay, and 4% supplement (DM basis). In year 1 the dietary hay source was oat hay while in year 2 the source was alfalfa. The supplement was formulated to provide minimum of 13.5% CP, Ca:P of 2:1, 30 g/ton Rumensin®, and 90 mg/d Tylan®.

All data were analyzed using the GLIMMIX procedure of SAS (SAS Institute, Inc., Cary, N.C.). The 2 years of data were analyzed separately due to variation in summer gains by year. Finishing pen within winter treatment was included as the experimental unit. Orthogonal contrasts were used to test linear and quadratic effects of winter supplementation level.

Results

Winter Phase

By design, initial BW was similar for each treatment, although year 1 heifers were lighter at 499 lb compared to year 2 at 529 lb. For both years, ADG linearly increased ($P < 0.01$) as MDGS supplementation increased (Table 1). In year 1, heifers gained 1.53, 1.67, and 1.91 lb/d, while year 2 heifers gained 1.43, 1.78, and 2.06 lb/d when supplemented 3, 5, and 7 lb of MDGS (DM) daily, respectively. Subsequently, winter phase ending BW increased linearly ($P < 0.01$) as supplementation amount increased. Heifers weighed 739, 756, and 790 lb for year 1 while in year 2 heifers weighed 726, 777, and 812 lb.

Table 1. Winter, summer and total forage system performance of spayed heifers

	Treatments[a]				*P*-value	
Item,	3	5	7	SEM	Linear	Quadratic
Winter, year 1[b]						
Initial BW, lb	503	499	496	4	0.24	0.81
ADG, lb	1.53	1.67	1.91	0.03	< 0.01	0.17
Ending BW, lb	739	756	790	5	< 0.01	0.22
Winter, year 2[b]						
Initial BW, lb	528	531	529	7	0.95	0.72
ADG, lb	1.43	1.78	2.06	0.02	< 0.01	0.16
Ending BW, lb	726	777	812	8	< 0.01	0.39
Summer, year 1[c]						
ADG, lb	0.80	0.68	0.50	0.03	< 0.01	0.32
Summer, year 2[c]						
ADG, lb	1.18	1.01	0.88	0.03	< 0.01	0.64
Total forage system, year 1[d]						
ADG, lb	1.20	1.23	1.20	0.02	0.85	0.12
Ending BW, lb	865	866	874	6	0.36	0.67
Total forage system, year 2[d]						
ADG, lb	1.29	1.36	1.42	0.02	< 0.01	0.69
Ending BW, lb	915	940	954	8	< 0.01	0.59

[a]Treatments = 3, 5, or 7 lb per day supplementation of modified distillers grains plus solubles during winter corn residue grazing
[b]Winter = corn stalk residue grazing for ~ 150 days
[c]Summer = smooth brome grass grazing for 30 days followed by native range grass for ~ 120 days
[d]Total forage system = average of winter + summer grazing performance

Summer Phase

During the summer phase for both years, heifer ADG linearly decreased ($P < 0.01$) as winter supplementation increased. In year 1, summer ADG was 0.80, 0.68, and 0.50 lb/d while year 2 ADG was 1.18, 1.01, and 0.88 lb/d when MDGS was supplemented at 3, 5, and 7 lb/d in winter. During year 1 summer grazing phase, the Sandhills area was undergoing severe drought conditions, thus explaining the difference in ADG for heifers compared to year 2 when grazing conditions were less severe.

When comparing heifer performance on total forage system (average of winter and summer), there was no difference in ADG ($P = 0.12$) or ending BW ($P = 0.36$) for year 1. However, in year 2 total forage system ADG increased linearly ($P < 0.01$) as winter supplementation increased (1.29, 1.36, and 1.42 lb per day, respectively). For year 2, ending BW linearly increased ($P < 0.01$).

Finishing Phase

For year 1 heifers, there was no difference ($P \geq 0.30$) in finishing performance across treatments (Table 2). Total system ADG (average of winter, summer, and finishing) was not different among treatments ($P = 0.91$). In year 2, final BW linearly increased ($P = 0.04$) from 1301 to 1356 lb due to winter supplementation. Gain and F:G were not different ($P \geq 0.25$) during the fall finishing phase due to winter supplementation. Year 2 total system ADG linearly increased ($P = 0.02$) from 1.82 to 1.95 lb/d as MDGS supplementation increased during the previous winter.

Carcass Characteristics

There were no differences in carcass characteristics ($P \geq 0.27$) for year 1. However in year 2, HCW increased linearly ($P = 0.04$) from 820 to 855 lb as winter supplementation increased, which is similar to previous findings (*2014 Nebraska Beef Cattle Report*, pp. 39–42). It has also been shown that long yearling heifers supplemented at a higher level during winter grazing, produce additional live weight and thus increased revenue (*2014 Nebraska Beef Cattle Report*, pp. 36–38). Similar with year 1, there was no difference in LM area ($P = 0.23$) or marbling score ($P = 0.28$). Contrary to year 1, there was a linear increase ($P = 0.04$) in 12th rib back fat thickness and consequently a linear increase in calculated yield grade ($P = 0.10$) as heifers were supplemented with increasing levels of MDGS in the winter phase.

Level of winter supplementation had no effect on finishing ADG or F:G when backgrounded on summer grass without supplement prior to feedlot arrival. However, higher levels of supplementation increased total system gain when summer grazing is not limited. Supplementing heifers at 7 lb/d MDGS during winter corn residue grazing has the potential to increase HCW and profit potential if maintaining ownership through finishing.

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Table 2. Finishing performance and carcass characteristics of spayed yearling heifers

	Treatments[a]				*P*-value	
	3	5	7	SEM	Linear	Quadratic
Performance, Year 1						
Final BW, lb[b]	1329	1331	1321	14	0.69	0.71
DMI, lb/d	28.5	28.4	28.4	0.4	0.91	0.90
ADG, lb	4.11	4.13	3.96	0.10	0.30	0.44
F:G	6.95	6.88	7.18	—	0.32	0.36
Total system ADG, lb[c]	2.03	2.04	2.02	0.03	0.91	0.63
Carcass characteristics, Year 1						
HCW, lb	837	839	832	9	0.67	0.70
LM area, in^2	13.7	13.8	13.8	0.1	0.60	0.56
Fat Thickness, in	0.53	0.54	0.53	0.02	0.85	0.59
Marbling Score[d]	517	498	508	10	0.50	0.27
Calculated YG	3.1	3.2	3.1	0.1	0.51	0.59
Performance, Year 2						
Final BW, lb[b]	1301	1347	1356	18	0.04	0.42
DMI, lb/d	29.7	30.6	29.8	0.4	0.86	0.07
ADG, lb	3.06	3.22	3.19	0.10	0.36	0.44
F:G	9.80	9.62	9.43	—	0.25	0.98
Total system ADG, lb[c]	1.82	1.92	1.95	0.04	0.02	0.44
Carcass characteristics, Year 2						
HCW, lb	820	848	855	11	0.04	0.43
LM area, in^2	13.1	13.4	13.3	0.1	0.31	0.23
Fat Thickness, in	0.56	0.56	0.64	0.02	0.04	0.19
Marbling Score[d]	561	548	568	12	0.69	0.28
Calculated YG	3.3	3.3	3.6	0.1	0.10	0.29

[a]Treatments = 3, 5, or 7 lb per day supplementation of modified distillers grains plus solubles during winter corn residue grazing
[b]Final BW = carcass adjusted
[c]Total system ADG = average of winter + summer + finishing performance
[d]400 = Small00, 500 = modest00, 600 = moderate00, 700 = Slightly Abundant00, 800 = Moderately Abundant00